



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,319	01/31/2005	Yasuo Ohama	52201-0632	7665

28481 7590 10/28/2008
TIAJOLOFF & KELLY
CHRYSLER BUILDING, 37TH FLOOR
405 LEXINGTON AVENUE
NEW YORK, NY 10174

EXAMINER

LAZORCIK, JASON L

ART UNIT	PAPER NUMBER
----------	--------------

1791

MAIL DATE	DELIVERY MODE
-----------	---------------

10/28/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/523,319	Applicant(s) OHAMA ET AL.	
	Examiner JASON L. LAZORCIK	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 5-8 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4 is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/31/2005, 3/3/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, consisting of claims 1-4 in the reply filed on July 10, 2008 is acknowledged.
2. Claims 5-8 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. **Claims 1-4 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the amended claims 1-3 of copending Application No. 10/555,853 dated April 7, 2008. Although**

Art Unit: 1791

the conflicting claims are not identical, they are not patentably distinct from each other.

5. Specifically, claim 1 of the noted application teaches a quartz glass crucible comprising a crucible base body or “an opaque outer layer” and an inner layer formed on an inside of the base body. Said inner layer comprises synthetic quartz glass extending from 0.15 L to 0.55 L and having a thickness in the range of 0.2 to 1.5mm as noted in claim 2. Said inner layer further comprises a natural quartz glass layer extending from 0.6 L to 1.0L as set forth in copending claim 3 and presents a thickness in the range of 0.4 to 5.0 mm.

6. Where the measurement of 1.0L is held equivalent to the claimed 1.0 H in the instant application, the copending claims 1-3 are understood to teach a crucible having a inner layer comprising synthetic quartz extending from the bottom of the quartz crucible to at least a height of 0.25H which reads upon the claimed “first part” and a natural quartz layer extending in the range of 0.5 H to 1 H which reads upon both the claimed “second part” and the “residual part” [claim 2]. The thickness ranges for the synthetic and natural quartz inner layers as discussed above are likewise understood to overlap and read upon the claimed ranges as required under the instant claims 3 and 4.

7. To the extent that the copending claims are silent regarding the claimed structure of the crucible base body, namely that the claimed body present “ a bottom part having a lowest side and a side wall having an upper end plane”, it is the Examiners position that such a crucible structure is either inherently provided in the copending claims or

Art Unit: 1791

would have represented an obvious extension over the copending claims for one familiar with quartz crucibles

8. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabian (US 6,548,131) in view of Hellmann (US 6,306,489).

(I) Natural quartz crucible with an inner layer of synthetic quartz is old and well known

12. Applicant admits (see Specification page 1, line 25 to page 2, line) that it is old and well known in the art to provide a quartz glass crucible having an inner layer fabricated from synthetic quartz glass. In view of this passage, it is understood by the

Art Unit: 1791

Examiner that a crucible having a bottom part and cylindrical side wall with a synthetic quartz inner layer extending over the entire inner surface of said crucible (e.g. from the bottom to a height of $1.0H$) is old and well known in the art.

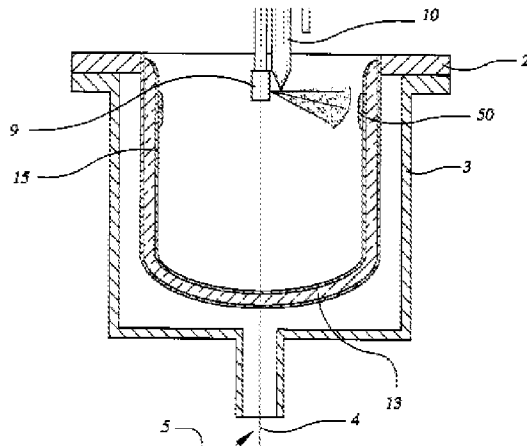
13. Similar to the above noted passage in Applicants Specification, Fabian teaches that quartz glass crucibles having the general form of a floor joined to a cylindrical side wall and comprising a base body of natural quartz with an inner layer formed from synthetic silica have been previously demonstrated in the art (col. 1, lines 15-42).

Fabian further recognized that providing a roughened surface on the inner layer of the crucible facilitates the early states of the silicon single crystal pulling process (see abstract and Col. 2, lines 4-43). Fabian states that this inner roughened layer is preferably located in the region of the starting zone and that "commonly the starting zone is in the upper third of the quartz glass crucible" (col. 5, lines 41-45).

14. With particular reference to the instant figure 5 (see excerpt below), Fabian teaches a crucible base body (13) having a bottom part having a lowest side and a side wall having an upper end plane. An inner layer (15) made of a synthetic quartz extends from the bottom to a height of $1.0 H$. A roughened surface (50) is provided in the upper third of the crucible (col. 5, lines 40-45) which effectively subdivides the inner layer into 1) a first part of inner layer (15) made of synthetic quartz and extending from the bottom to at least a height of $0.25 H$ and up to the roughened surface, 2) a second part provided in the upper third (e.g. approximately $0.66H$ to approximately $1.0H$), and a residual part (15) made of synthetic quartz and located between the upper terminus of the roughened surface (50) and the upper end plane of the base body (13). Regarding

Art Unit: 1791

claims 3 and 4, the Fabian teaches that the synthetic layer (15) (col. 5, lines 29-34) and the roughened portion (50) (col. 7, lines 53-57) are both about 2.5 mm thick and that the roughened surface (50) may be formed upon or instead of the synthetic silica layer (15) (col. 7, lines 55-57).



15.

16. Fabian teaches that in order to fabricate the roughened surface, silica granulate is mixed with a low weight fraction of a compound (e.g. Si_3N_4) which decomposes during heating to release gases. After vitrification, the process results in a bubble containing surface layer (50) falling within the approximate "starting zone" for pulling a single crystal from a silicon melt contained within the crucible.

17. It is evident from the foregoing that Fabian teaches providing a high bubble content inner layer in the approximate region (e.g. $\sim 0.66H$ to $\sim 1.0H$) which overlaps the "second part" presently claimed by Applicant (e.g. $\sim 0.5H$ to $\sim 0.8H$). Fabian teaches a preferred embodiment wherein the roughened surface (50) is fabricated from a mixture of synthetic SiO_2 granulate and a trace amount of gas forming compound.

(II) Fabian is silent regarding use of natural quartz in roughened portion (50)

Art Unit: 1791

18. Fabian is silent regarding preparation of the noted roughened portion (50) from "a naturally occurring quartz glass or .. of mixed quartz glass of naturally occurring and synthetic quartz glass" as presently claimed.

(III) Obvious to substitute naturally occurring quartz in roughened area (50) in view of Hellmann

19. The reference to Hellmann (US 6,306,489) teaches a similar structural arrangement to that treated in the Fabian reference above. With particular reference to the instant figure 2 excerpt, Hellman teaches a natural quartz base body (9) provided with an segmented inner layer comprising a natural quartz segment (14), a synthetic quartz segment (13), and a segment fabricated from a mixture of natural quartz powder and a gas forming compound (e.g. Si_3N_4).

20. Hellman further notes that "high purity quartz glass ... is relatively expensive" and that substituting lower purity natural quartz for high purity synthetic quartz represents an effective way to decrease manufacturing costs (col. 3, lines 61-64).

21. Although Fabian is silent regarding the use of natural quartz in the formation of the roughened region, the reference in no manner explicitly excludes its use in the fabrication of the quartz crucible. The reference to Hellmann teaches in a very similar process that natural quartz may be employed along with Silicon Nitride to form a high bubble content inner layer upon a natural quartz base body. Hellman further teaches that it is beneficial to replace synthetic quartz with the natural variant since doing so results in decreased manufacturing costs

Art Unit: 1791

22. It follows that one of ordinary skill would find a reasonable expectation of success for fabricating the high bubble content “roughened zone” (50) from natural quartz instead of the preferred synthetic quartz in the Fabian crucible since a similar process has been demonstrated in the Hellmann reference. Further, one of ordinary skill in the art would be motivated to perform such a substitution as an approach to decrease manufacturing costs since such a benefit was explicitly contemplated in the Hellmann reference. It follows, absent compelling evidence to the contrary, that Applicants claimed invention constitutes a simple substitution of one known element (e.g. natural quartz) for another (e.g. synthetic quartz) to yield a predictable result, namely the high bubble content layer and that one of ordinary skill would have found it obvious to try said substitution in order to garner the noted decrease in manufacturing costs.

23. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima (US 5,306,473) in view of Matsumura (US 5,174,801).

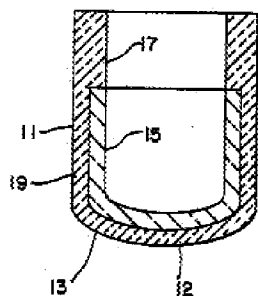
(I) Nakamura teaches a quartz crucible having an inner layer segmented by bubble content

24. Regarding claims 1 and 2 and with particular reference to the instant figure 2 (see below), Nakajima (US 5,306,473) teaches a quartz glass crucible comprising a crucible base body (19) comprising a bottom part (12) having a lowest side and a side wall (11) having an upper end plane. An inner layer comprising an opaque upper area opaque upper layer (17) and a transparent lower layer (15) is provided. The inner layer

Art Unit: 1791

is noted to have "an average thickness ... ranging from about 25% to 40% of the total thickness of the crucible" (col. 5, lines 28-30). Regarding the inner layers, the reference teaches that the opaque area has a total volume of bubbles ranging from $7 \times 10^{-3} \text{ cm}^3/\text{cm}^3$ to $30 \times 10^{-3} \text{ cm}^3/\text{cm}^3$ (e.g. between 0.7% and 3% bubbles by volume) and that the transparent layer comprises less than $4 \times 10^{-3} \text{ cm}^3/\text{cm}^3$ (e.g. less than 0.4% bubbles by volume). Nakajima further teaches that the opaque inner layer extends within 75% or less of the total height of the crucible" with the balance of the inner surface characterized by the transparent inner layer.

25. With respect to Applicants claimed invention, Nakamura teaches a first inner layer part comprising transparent quartz and extending from the bottom of crucible to "at least a height of $0.25H$ " and up to a height of approximately $0.75H$ or more. Nakamura further teaches a second inner layer part comprising an opaque quartz material which extends approximately in the range of $0.75H$ to the upper end plane of the wall.



26.

(II) Nakajima is silent regarding the type of quartz used for the inner/outer layers

27. Nakajima is silent regarding the use of synthetic or natural quartz for formation of either of the inner layers or the outer layer of the crucible.

(III) Use of natural/synthetic quartz in the claimed manner for the inner layer of the crucible is obvious in light of Matsumura

Art Unit: 1791

28. Matsumura teaches the fabrication of a crucible for pulling single crystal silicon substrates from a silicon melt. The reference teaches that it is known to use natural quartz for forming a crucible structure "having a lot of visible bubbles" and that it is likewise known to utilize a synthetic quartz material for forming "transparent" layers which are "substantially free from bubbles (see particularly col. 1, lines 15-44, and col 2., line 65 - col. 3, line 32). The reference further teaches a typical crucible size having a diameter of 14 inches and a wall thickness of 7.9 mm (see col. 8, lines 8-10).

29. It follows in view of the Matsumura disclosure, that a natural quartz material would have represented an obvious choice for forming the opaque quartz base body (19) and opaque quartz upper layer (17) since natural quartz is known to form an opaque glass structure having a relatively high bubble content as required by the Nakajima reference. Similarly synthetic quartz would have represented an obvious choice for the transparent lower layer (15) since such a material is known to form a transparent glass structure which is essentially free from bubbles and since such glass properties are again promoted in the Nakajima reference. At the very least, it would have been obvious for one of ordinary skill in the art to try the natural quartz for the base body and upper layer and synthetic quartz for the lower layer of the Nakamura since such materials would be reasonably expected to produce the desired bubble structures as required by the Nakamura disclosed crucible structure.

30. Further, Matsumura teaches a crucible wall thickness of 7.9mm and Nakamura teaches crucible inner layer thicknesses ranging from about 25% to 40% of the total thickness of the crucible, inner layer thicknesses (e.g. transparent or opaque inner

Art Unit: 1791

layers) having a thickness in the range of ~1.9mm to ~3.2 mm would have been obvious to one of ordinary skill in the art. It follows that Applicants claimed ranges as set forth in pending **claims 3 and 4** overlap these ranges and would have been viewed as obvious to one of ordinary skill.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited references to Nakajima (US 5,306,388), Hansen (US 5,980,629), and Sato (US 6,136,092) are all deemed to be closely related to Applicants claimed crucible structure. Any reply to the instant Office Action should carefully consider the scope and content of each reference in comparison with Applicants claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON L. LAZORCIK whose telephone number is (571)272-2217. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1791

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason L Lazorcik/
Examiner, Art Unit 1791